



Service Data

SD-08-2415A

Bendix® AD-RP™ Remote Purge & AD-RP™ PuraGuard® Oil Coalescing Remote Purge Air Dryers

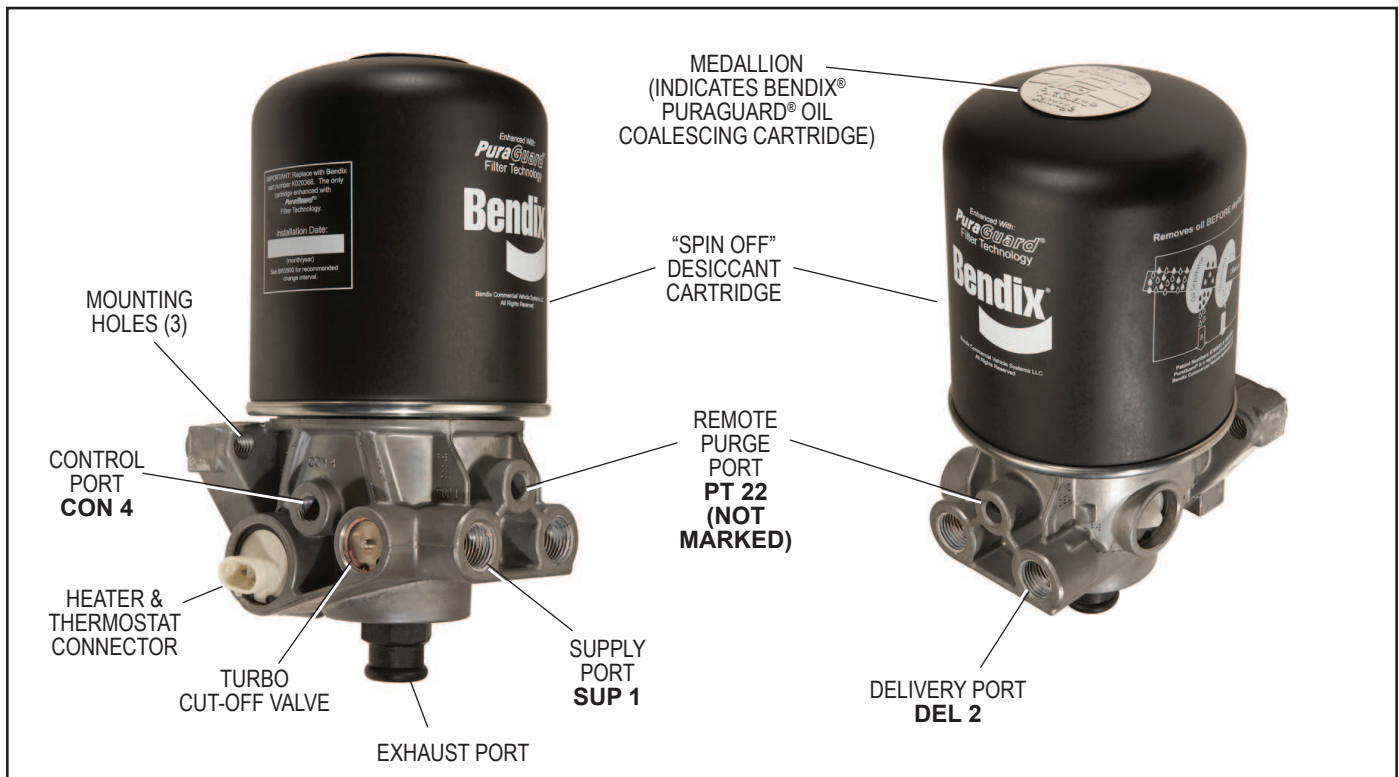


FIGURE 1 - BENDIX® AD-RP™ REMOTE PURGE AIR DRYER

DESCRIPTION

The function of the Bendix® AD-RP™ remote purge air dryer — and the AD-RP™ remote purge air dryer with PuraGuard® oil coalescing technology — is to collect and remove air system contaminants in solid, liquid and vapor form before they enter the brake system. The dryer provides clean, dry air to the components of the brake system which increases the life of the system and reduces maintenance costs. Daily manual draining of the reservoirs is eliminated.

The Bendix AD-RP PuraGuard oil coalescing air dryer has an identical appearance to the standard AD-RP air dryer but contains a coalescing media at the inlet of the desiccant bed. The coalescing media provides a higher level of oil removal over the standard AD-RP unit. The AD-RP PuraGuard oil coalescing air dryer has all of the same functions as the standard AD-RP air dryer and is used in applications where lower oil concentration levels are required.

IMPORTANT! When servicing, note that standard AD-RP air dryers or air dryer cartridges may be serviced with PuraGuard oil coalescing air dryers or cartridges. The PuraGuard oil coalescing air dryers or cartridges, however, must only be serviced with like replacements.

Note: Unless otherwise stated in this manual, AD-RP air dryer refers to both the standard and PuraGuard oil coalescing remote purge air dryers.

The remote purge designation is used because the AD-RP air dryer uses a small air volume, separate from the air brake system, to perform the purge or regenerative function.

The AD-RP air dryer consists of two major component groups—a spin on desiccant cartridge assembly, and a die cast aluminum body assembly. The desiccant cartridge is self-contained and serviced as a complete assembly.

GENERAL SAFETY GUIDELINES



WARNING! PLEASE READ AND FOLLOW THESE INSTRUCTIONS



TO AVOID PERSONAL INJURY OR DEATH:

When working on or around a vehicle, the following guidelines should be observed **AT ALL TIMES**:

- ▲ Park the vehicle on a level surface, apply the parking brakes and always block the wheels. Always wear personal protection equipment.
- ▲ Stop the engine and remove the ignition key when working under or around the vehicle. When working in the engine compartment, the engine should be shut off and the ignition key should be removed. Where circumstances require that the engine be in operation, **EXTREME CAUTION** should be used to prevent personal injury resulting from contact with moving, rotating, leaking, heated or electrically-charged components.
- ▲ Do not attempt to install, remove, disassemble or assemble a component until you have read, and thoroughly understand, the recommended procedures. Use only the proper tools and observe all precautions pertaining to use of those tools.
- ▲ If the work is being performed on the vehicle's air brake system, or any auxiliary pressurized air systems, make certain to drain the air pressure from all reservoirs before beginning **ANY** work on the vehicle. If the vehicle is equipped with a Bendix® AD-IS® air dryer system, a Bendix® DRM™ dryer reservoir module, or a Bendix® AD-9si™ air dryer, be sure to drain the purge reservoir.
- ▲ Following the vehicle manufacturer's recommended procedures, deactivate the electrical system in a manner that safely removes all electrical power from the vehicle.
- ▲ You should consult the vehicle manufacturer's operating and service manuals, and any related literature, in conjunction with the Guidelines above.
- ▲ Never exceed manufacturer's recommended pressures.
- ▲ Never connect or disconnect a hose or line containing pressure; it may whip. Never remove a component or plug unless you are certain all system pressure has been depleted.
- ▲ Use only genuine Bendix® brand replacement parts, components and kits. Replacement hardware, tubing, hose, fittings, etc. must be of equivalent size, type and strength as original equipment and be designed specifically for such applications and systems.
- ▲ Components with stripped threads or damaged parts should be replaced rather than repaired. Do not attempt repairs requiring machining or welding unless specifically stated and approved by the vehicle and component manufacturer.
- ▲ Prior to returning the vehicle to service, make certain all components and systems are restored to their proper operating condition.
- ▲ For vehicles with Automatic Traction Control (ATC), the ATC function must be disabled (ATC indicator lamp should be ON) prior to performing any vehicle maintenance where one or more wheels on a drive axle are lifted off the ground and moving.
- ▲ The power **MUST** be temporarily disconnected from the radar sensor whenever any tests USING A DYNAMOMETER are conducted on a Bendix® Wingman® Advanced™-equipped vehicle.

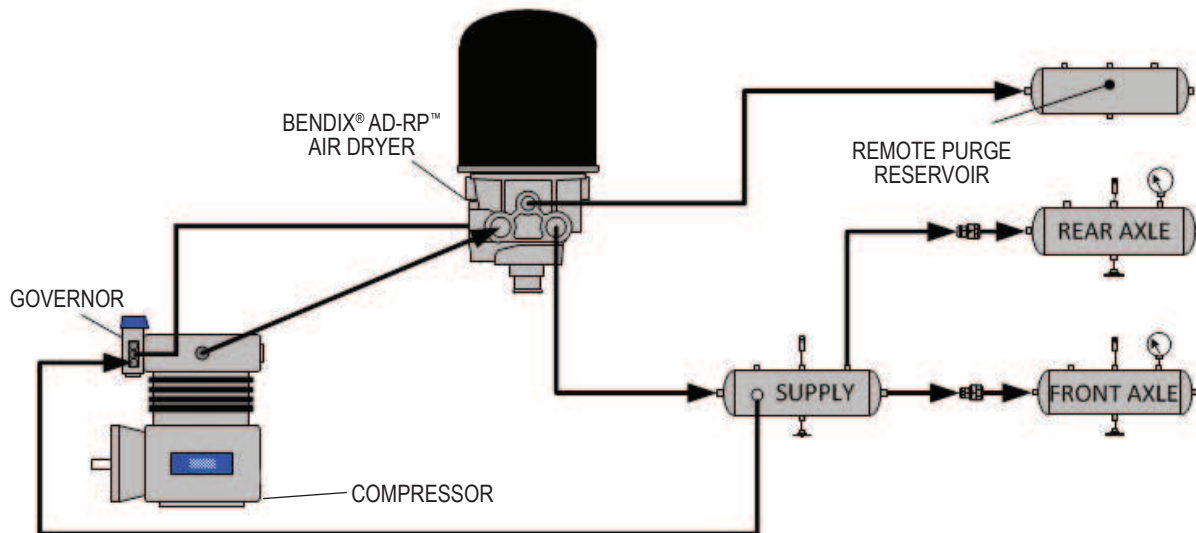


FIGURE 2 - BENDIX® AD-RP™ AIR DRYER SYSTEM DRAWING

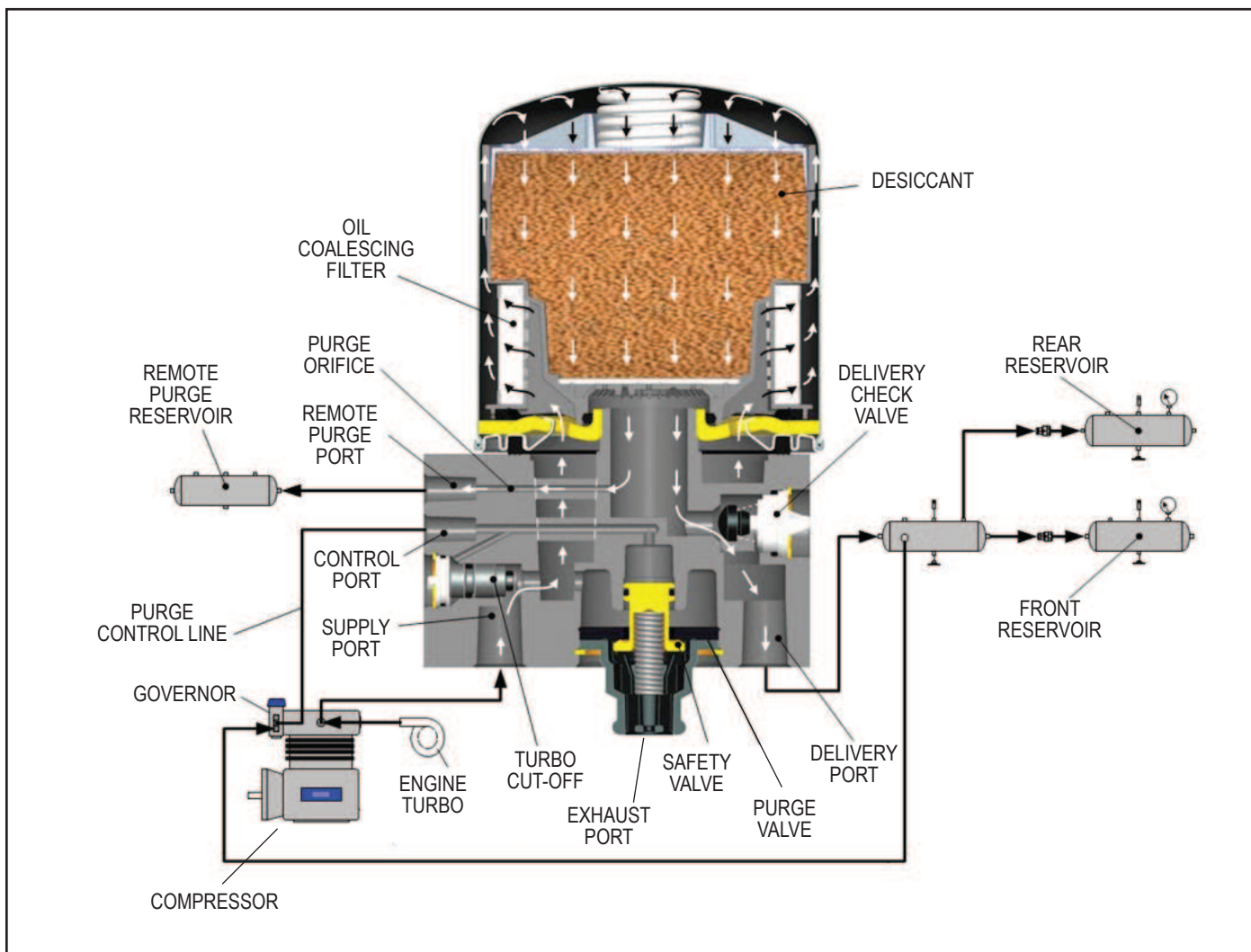


FIGURE 3 - BENDIX® AD-RP™ AIR DRYER SYSTEM - CHARGE CYCLE

The aluminum body of the Bendix® AD-RP™ air dryer contains the following serviceable components or assemblies: the turbocharger cut-off valve; the heater and thermostat assembly; a delivery check valve assembly; and the combined purge and relief valve assembly. All service and replacement can be accomplished from the exterior of the dryer without removing it from the vehicle. The spin-on desiccant cartridge is removed and installed using a “strap wrench.”

The AD-RP air dryer has four female pipe thread air connections identified as follows: (Also refer to Figure 1.)

Air Connection Port ID Function/Connection	
CON 4	Control Port (purge valve control & turbo cut-off)
SUP 1	Supply Port (air in)
DEL 2	Delivery Port (air out)
PT 22 (not identified on the air dryer)	Remote Purge Port

OPERATION

GENERAL

The AD-RP air dryer alternates between two operational modes or “cycles” during operation: the *Charge Cycle* and the *Purge Cycle*. What follows is a description of operation separated into these “cycles”.

CHARGE CYCLE (Refer to Figure 3.)

When the compressor is loaded (compressing air) compressed air — along with oil, oil vapor, water and water vapor — flows through the compressor discharge line to the supply port of the air dryer body. Air entering the supply port immediately encounters the “turbo cut-off” valve. With no air pressure in the control port, the turbo cut-off piston moves the valve away from its seat in the body, allowing the supply air to enter the body. As air travels through the end cover assembly, its direction of flow changes several times, reducing the temperature, causing contaminants to condense and drop to the bottom (or sump) of the air dryer body. After exiting the end cover, the air flows into the desiccant cartridge where an oil separator — or coalescing filter, if equipped with a Bendix® PuraGuard® oil coalescing

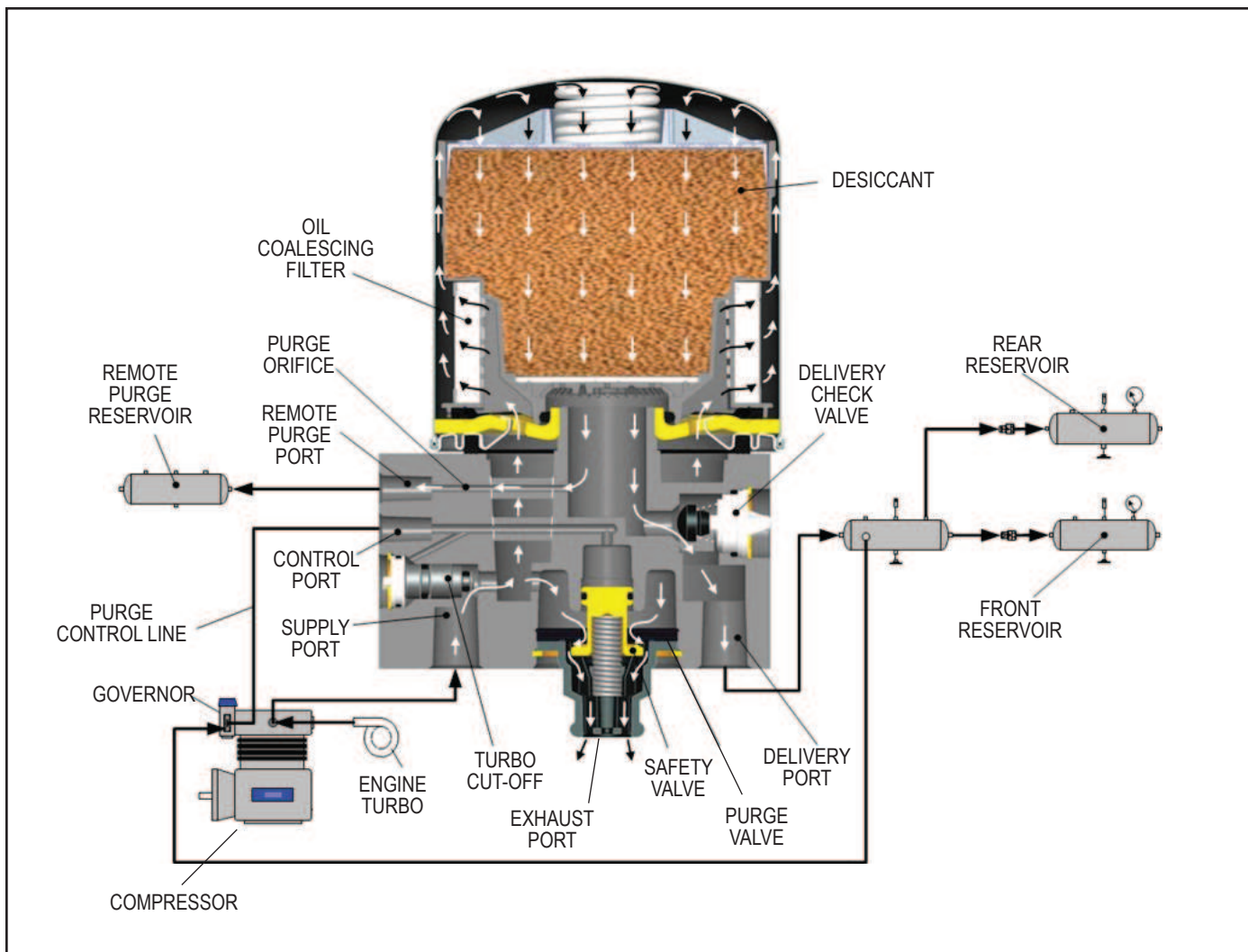


FIGURE 4 - BENDIX® AD-RP™ AIR DRYER SYSTEM - RELIEF VALVE OPERATION

cartridge, located between the outer and inner shells of the cartridge — removes water in liquid form, as well as liquid oil and solid contaminants.

After exiting the oil separator, air enters the space between the desiccant drying bed and the outer cartridge shell and flows down through the column of desiccant. Flowing through the desiccant column, air becomes progressively more dry as water vapor adheres to the desiccant material in a process known as “ADSORPTION.” Using the adsorption process, the desiccant cartridge typically removes 95% of the water vapor from the pressurized air.

Dry air exits the bottom of the desiccant cartridge through its center opening and returns to the air dryer body assembly. The air then flows through the delivery check valve assembly and out the delivery port to the first (supply) reservoir of the air system.

The air dryer will remain in the charge cycle until the air brake system pressure builds to the governor cut-out setting. To protect against over pressurization of the Bendix® AD-RP™ air dryer, the purge valve incorporates an integral relief valve feature. In the event

that the compressor unloader mechanism or governor malfunctions, at approximately 200 psi — supply air pressure, the AD-RP air dryer purge valve will open (without control pressure) and vent excess air pressure to atmosphere. (Refer to Figure 4)

PURGE CYCLE (Refer to Figure 5)

When air brake system pressure reaches the cut-out setting of the governor — typically 130 psi — the compressor unloads (air compression is stopped) and the purge cycle of the air dryer begins. When the governor unloads the compressor, it pressurizes both the compressor unloader mechanism and the line connecting the governor unloader port to the control port of the AD-RP air dryer body. Air entering the control port is simultaneously directed to the turbo cut-off valve and the purge valve control piston. The initial purge cycle consists of two simultaneous occurrences: (a) the closing of the turbo cut-off valve; and (b) the opening of the purge valve. Each is discussed below under a separate subheading.

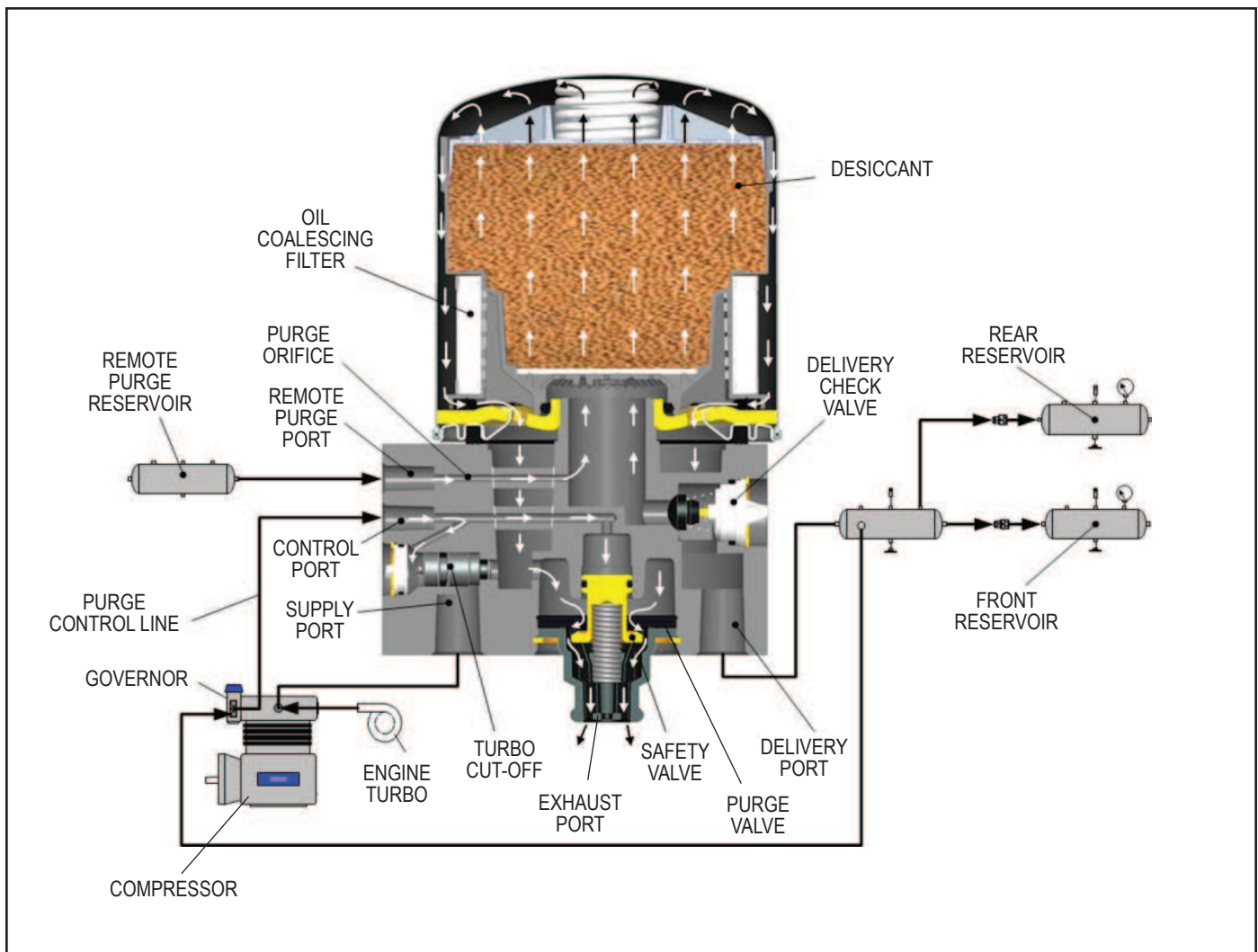


FIGURE 5 - BENDIX® AD-RP™ AIR DRYER SYSTEM - PURGE CYCLE

TURBO CUT-OFF VALVE (Refer to Figure 5)

The primary function of the turbo cut-off valve is to prevent loss of engine turbocharger air pressure through the Bendix® AD-RP™ air dryer in systems where the compressor intake is connected to the engine turbocharger. The turbo cut-off valve also eliminates the “puffing” of air out the open air dryer exhaust when a naturally aspirated, single cylinder compressor is equipped with an inlet check valve. Governor unloader pressure causes the turbo cut-off valve piston to move and close. With the turbo cut-off valve piston seated (closed position), air in the discharge line and AD-RP air dryer inlet port is prevented from entering the air dryer.

PURGE PISTON

The Bendix® AD-RP™ air dryer purge piston also moves in response to governor unloader pressure, causing the purge valve to open to atmosphere. Contaminants in the body sump are instantly expelled when the purge valve opens. Air — which was flowing through the desiccant cartridge — immediately changes direction and begins to flow back toward the open purge valve. Oil and solid contaminants collected by the oil separator are removed by air flowing from the desiccant drying bed to the open purge valve.

DESICCANT RE-ACTIVATION (DRYING THE DESICCANT)

The initial decompression of the air dryer assembly lasts only a few seconds and is evidenced by an audible burst of air at the AD-RP air dryer exhaust. The actual reactivation of the desiccant drying bed begins as dry air flows from the purge volume through the purge orifice in the body and into the desiccant bed. Pressurized air from the purge volume expands after passing through the purge orifice; its pressure is lowered and its volume increased. The flow of dry air through the drying bed reactivates the desiccant material by removing the water vapor adhering to it. Generally 30 seconds minimum are required for the entire purge volume of a standard AD-RP air dryer to flow through the desiccant drying bed.

The delivery check valve assembly prevents air in the brake system from returning to the air dryer during the purge cycle. After the purge cycle is complete, the desiccant has been reactivated (or dried), and the air dryer is ready for the next charge cycle to begin. However, the purge valve will remain open and will not close until air brake system pressure is reduced and the governor signals the compressor to charge the system.

PREVENTIVE MAINTENANCE

Important: Review the warranty policy before performing any intrusive maintenance procedures. An extended warranty may be voided if intrusive maintenance is performed during this period. Because no two vehicles operate under identical conditions, maintenance and maintenance intervals will vary. Experience is a valuable guide in determining the best maintenance interval for any one particular operation.

Every 900 operating hours; or every 25,000 miles or three (3) months:

1. Check for moisture in the air brake system by opening reservoirs, drain cocks or drain valves and checking for the presence of water. If moisture is present, the desiccant cartridge may require replacement; however, the following conditions can also cause water accumulation and should be considered before replacing the desiccant:
 - A. An outside air source has been used to charge the system. This air does not pass through the drying bed.
 - B. Air usage is exceptionally high and not normal for a highway vehicle. This may be due to accessory air demands or some unusual air requirement that does not allow the compressor to load and unload (compressing and non-compressing cycle) in a normal fashion. Check for high air system leakage. If the vehicle vocation has changed, it may be necessary to upgrade the compressor size. Refer to Appendix A / Table A in this document. See the column titled Vehicle Vocation.
 - C. The air dryer has been installed in a system that has been previously used without an air dryer. The system will be saturated with moisture and several weeks of operation may be required to dry it out.
 - D. Location of the air dryer is too close to the air compressor. Refer to Locating the Bendix® AD-RP™ Air Dryer On Vehicle section, plus Appendix A / Table A/ column 2 for discharge line length.
 - E. In areas where more than a 30 degree range of temperature occurs in one day, small amounts of water can temporarily accumulate in the air brake system due to condensation. Under these conditions, the presence of small amounts of moisture is normal and should not be considered as an indication that the dryer is not performing properly.

Note: A small amount of oil in the system is normal and should not be considered as a reason to replace the desiccant cartridge; oil-stained desiccant can function adequately.

2. Visually check for physical damage to the AD-RP air dryer such as a dented desiccant cartridge, chafed or broken air and electrical lines, and broken or missing parts.
3. Check mounting bolts for tightness. Re-torque to 50 lb-ft.
4. Perform the Operation & Leakage Tests listed in this publication.

Every 3,600 operating hours, or every 100,000 miles or twelve (12) months:

1. Test the AD-RP air dryer turbo cut-off and purge valves for leakage. Disconnect the supply, control and delivery lines from the AD-RP dryer. Perform the tests below in the order they are presented.
 - A. Apply 120 psi shop air pressure to the control port and a soap solution to the supply port. If leakage exceeds a one (1) inch bubble in five (5) seconds, repair the turbo cut-off piston and valve before proceeding to step 2.
 - B. With 120 psi shop air pressure applied to the control port, apply a soap solution to the purge exhaust port. If leakage exceeds a one (1) inch bubble in five (5) seconds, repair the purge piston and valve before proceeding to step 2.
 - C. With 120 psi shop air pressure applied to the control and supply port, apply a soap solution to the purge exhaust port. If leakage exceeds a one (1) inch bubble in five (5) seconds, repair the turbo cut-off piston and valve before proceeding to step 2.
 - D. With a plug installed in the delivery port, 0 psi in the control port, and 120 psi applied to the supply port, apply a soap solution to the purge exhaust port. If leakage exceeds a one (1) inch bubble in five (5) seconds, repair the purge piston and valve before proceeding to step 2.
2. Perform the Operation & Leakage Tests shown in this publication.

Every 10,800 hours; or every 350,000 miles or 36 months:

1. Replace the air dryer desiccant cartridge.

Note: The desiccant change interval may vary from vehicle to vehicle. Although typical desiccant cartridge life is three years, many will perform adequately for a longer period of time. In order to take maximum advantage of desiccant life and ensure that replacement occurs only when necessary, it is important that you perform the Operation & Leakage Tests.

2. Perform the Operation & Leakage Tests shown in this publication.

For Bendix® AD-RP™ PuraGuard® oil coalescing air dryers only: Preventive Maintenance is as easy as 1-2-3

Adhering to a preventive maintenance schedule is crucial to keeping a vehicle's air system clean and to help ensure superior performance of all components that utilize system air — such as brakes, emissions equipment and automated manual transmissions. Depending on vocation, Bendix recommends a 1, 2 or 3-year air dryer cartridge replacement on vehicles equipped with a Bendix® compressor.

For severe service application — such as residential refuse trucks or school buses — the air dryer cartridge should be replaced every year or every 100,000 miles. For pick-up and delivery operations, or for double- and triple-trailer line haul trucks, replacement is recommended every two years or 200,000 miles. Line-haul operations using a single trailer should swap the filter out every three (3) years or 300,000 miles. The recommended intervals for trucks equipped with non-Bendix compressors are 6 months (50,000 miles), one year (100,000 miles), and two years (200,000 miles), respectively.

More frequent intervals may be required depending on a vehicle's age, its compressor condition, use of a non-Bendix compressor, the operating environment, the vehicle's vocation, and its usage. In conjunction with these guidelines, fleets can determine the functionality of their filters by checking for moisture in the air brake system monthly. If moisture is present, the air dryer cartridge may require replacement. Refer to the Bendix Service Data Sheet of the specific air dryer for additional information.



This air dryer is intended to remove moisture and other contaminants normally found in the air brake system. Do not inject alcohol, anti-freeze, or other de-icing substances into or upstream of the air dryer. Alcohol is removed by the dryer, but reduces the effectiveness of the device to dry air. Use of other substances can damage the air dryer and may void the warranty.

OPERATION & LEAKAGE TESTS (ALSO SEE VIDEO BW2327*)

1. *Check for excessive leakage around the purge valve.* With the compressor in the loaded mode (compressing air), apply a soap solution to the purge valve exhaust port and observe that leakage does not exceed a one (1) inch bubble in five (5) seconds. If the leakage exceeds the maximum specified, service the purge valve assembly.
2. *Check for leakage around the desiccant cartridge.* With the compressor in loaded mode (compressing air), apply a soap solution around the desiccant cartridge

seal and observe that no leakage occurs. If leakage is noted, tighten the cartridge using a strap wrench and re-test for leakage.

3. *While observing the dash gauge(s), build up system pressure at approximately 1,800 engine/compressor rpm to governor cut-out.* Note the pressure on the dash gauge(s) at the moment governor cut-out occurs and that the Bendix® AD-RP™ air dryer purges with an audible escape of air. Observe the dash gauge(s) pressure for two minutes after the purge cycle begins. The front axle service (secondary) and the rear axle (primary) reservoir pressures should not drop more than 2 psi below the governor cut-out pressure noted. Perform this test three times to positively confirm the values. If the pressure drop in the reservoirs exceeds 2 psi, check the air brake system for excessive leakage and repair.

Build up system pressure to governor cut-out, wait a minimum of 30 seconds for the purge cycle to complete, then apply and release the service brakes to reduce system air pressure to governor cut-in. Note that the system once again builds to full pressure and is followed by an Bendix AD-RP air dryer purge.

4. *Check the operation of the heater and thermostat assembly in the body during cold weather operation (if possible) as follows:*

A. Electric Power to the Heater and Thermostat

With the ignition or engine kill switch in the ON position, check for voltage to the heater and thermostat assembly using a voltmeter or test light. Unplug the electrical connector at the air dryer and place the test leads on each of the pins of the male connector. If there is no voltage, look for a blown fuse, broken wires, or corrosion in the vehicle wiring harness. Check to see if a good ground path exists.

B. Thermostat and Heater Operation

Turn off the ignition switch and cool the body assembly to below 40° F.

Note: *If this test is performed in warm weather (above 30° F) it may be necessary to remove the heater and thermostat assembly and cool it in a freezer.*

Using an ohmmeter, check the resistance between the electrical pins in the connector. The resistance should be 1.5 to 1.7 ohms for the 12 volt heater assembly and 6.0 to 6.9 ohms for the 24 volt heater assembly. If the resistance is higher than the maximum stated, replace the heater and thermostat assembly.

Warm the heater and thermostat assembly to over 90°F and once again check the resistance. The resistance should exceed 1000 ohms. If the resistance values obtained are within the stated limits, the thermostat and heater assembly is operating properly. If the resistance values obtained are outside the stated limits, replace the heater and thermostat assembly.

* Available through the Bendix Marketing Center on www.bendix.com

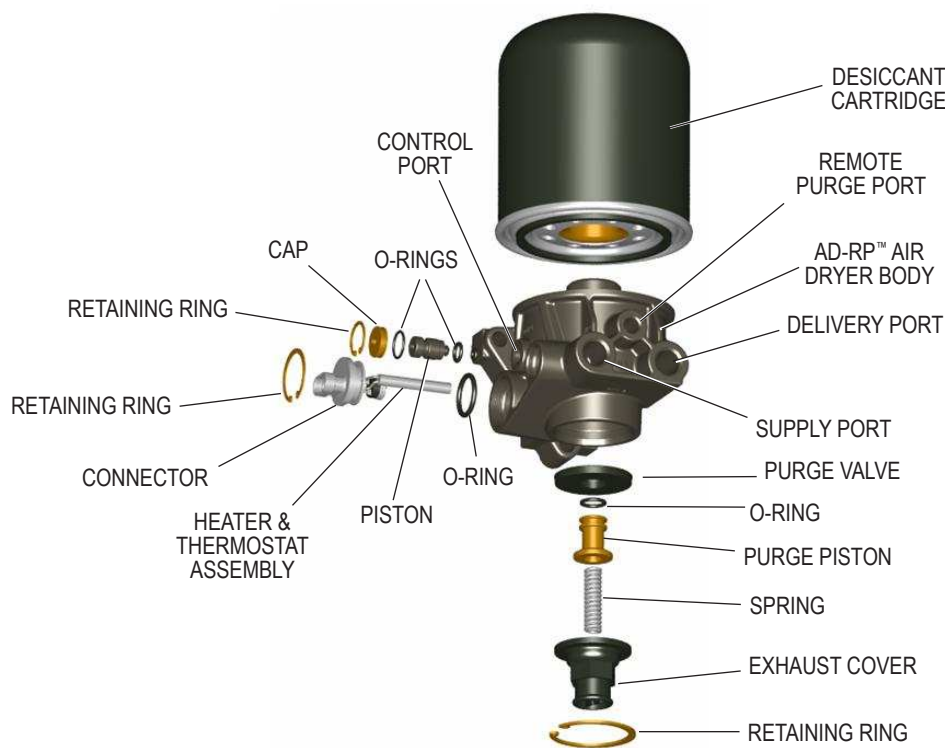


FIGURE 6 - BENDIX® AD-RP™ REMOTE PURGE AIR DRYER EXPLODED VIEW

REPAIRING THE BENDIX® AD-RP™ AIR DRYER

GENERAL

If — after completing the routine operation and leakage tests — it has been determined that one or more components of the air dryer requires replacement or maintenance, refer to the list below to find the appropriate kit(s). When repairing or replacing components of the air dryer use only genuine Bendix® parts.

Maintenance Kits Available	
Part Number	Kit
109495	12 Volt Replacement Heater & Thermostat Assembly Kit
109496	24 Volt Replacement Heater & Thermostat Assembly Kit
109993	Turbo Cut-Off Maintenance Kit
5008414	Standard Desiccant Cartridge Replacement Kit
5008414PG	Bendix® PuraGuard® Desiccant Cartridge Replacement Kit
109995	Purge & Relief Valve Maintenance Kit
5008972	Purge Volume Kit (uses 288 cu. in. reservoir part no. 275816)
For a more complete listing of service parts refer to the Bendix Quick Reference Catalog (BW1114).	

BENDIX AD-RP AIR DRYER REMOVAL

1. Park the vehicle on a level surface and prevent movement by means other than the brakes.
2. Drain ALL reservoirs to 0 psi (0 kPa) **Caution: The compressor discharge line may still contain residual pressure.**
3. Identify, mark and disconnect the supply, delivery, control, and remote purge port air lines. Disconnect the wiring harness connector from the heater and thermostat assembly connector on the body assembly.
4. If so equipped, disconnect, remove and save the exhaust line from the exhaust port of the air dryer.
5. Remove the three mounting bolts that secure the air dryer to the vehicle and remove the air dryer.

Note: It is important to retain the three mounting bolts since their length is specific to mounting the air dryer without damage. If these bolts must be replaced, the same length must be used.

6. Remove the Bendix® AD-RP™ air dryer from its mounting brackets on the vehicle.

DISASSEMBLY FOR PART REPLACEMENT AND KIT INSTALLATION

1. The following disassembly and assembly procedures are presented for reference and assumes that the appropriate Bendix® AD-RP™ air dryer kits are on hand. The instructions provided with these parts and kits should be followed instead of the instructions presented here.
2. The replacement parts and maintenance kits that are available do not require full disassembly and in most cases do not require the removal of the AD-RP air dryer from the vehicle.
3. If removal of the air dryer is necessary, adhere to the following caution:

CAUTION: While performing service on the AD-RP air dryer, it is **not** recommended that a clamping device (vise, C-clamp, etc.) be used to hold any die cast aluminum component as damage may result. To hold the body, install a pipe nipple in the supply port and clamp the nipple into a vise.

DISASSEMBLY - TURBO CUT-OFF VALVE

1. Loosen the supply port line and allow any residual air in the compressor discharge line to drain.
2. Remove the retaining ring from the body assembly, then remove the turbo cut-off cap from the body. Remove the turbo cut-off cap o-ring.
3. Remove the turbo cut-off piston from the body.
4. Remove the large and small diameter o-rings from the piston.

DISASSEMBLY - PURGE/RELIEF VALVE

1. If so equipped, disconnect, remove and save the exhaust line from the exhaust port of the air dryer.
2. Remove the retaining ring from the body assembly, then remove the non-metallic exhaust cover and spring from the body. **Note:** *The spring exerts a 30 pound force against the exhaust cover.*
3. Carefully remove the purge piston from the body and remove the o-ring from the purge piston.
4. The purge valve has two different sides. Note which side is visible **before** removing the valve. Remove the valve from the body.

DISASSEMBLY - HEATER AND THERMOSTAT

1. Disconnect the vehicle wiring harness connector that mates with the heater and thermostat connector on the body. Pry the lock tabs on the vehicle wiring harness connector out, before removal from the air dryer connector. Make sure the connector seal is present on the vehicle wiring harness connector.
2. Remove the retaining ring that secures the heater and thermostat in the body.
3. Carefully pull the heater and thermostat assembly straight out of the body.
4. Remove the o-ring from the heater connector.

DISASSEMBLY - DESICCANT CARTRIDGE

1. Place a strap wrench, or equivalent tool, on the desiccant cartridge next to the lip low on the cartridge. Rotate counterclockwise to remove the desiccant cartridge.

CLEANING, INSPECTION AND ASSEMBLY PREPARATION

1. Clean the exterior of the body.
2. Using a clean rag, wipe the body bores clean.
3. Inspect for physical damage to the body casting, broken and/or missing parts.
4. Inspect the interior and exterior of the body for severe corrosion, pitting and cracks. Superficial corrosion and/or pitting on the exterior portion is acceptable.
5. Inspect the bores, valve seating and o-ring contact areas for deep scuffing or gouges or nicks that would not permit an air tight seal.
6. Inspect the pipe threads in the body. Make certain they are clean and free of thread sealant.
7. Inspect the purge valve piston seat for nicks and excessive wear.
8. Inspect all air line fittings for corrosion. Clean all old thread sealant from the pipe threads.
9. All o-rings removed should be discarded and replaced with new o-rings provided in the appropriate kit(s).
10. Lubricate the body bores and o-ring grooves, in the body and components, with the grease supplied in the Bendix® maintenance kits.
11. Lubricate all o-rings with the grease supplied in the Bendix maintenance kits. Any component exhibiting a condition described in steps 3 to 8 should be replaced.

ASSEMBLY - TURBO CUT-OFF VALVE

1. Lubricate all o-rings with the grease supplied in the Bendix® maintenance kits.
2. Install the large and small diameter o-rings on the piston.
3. Install the turbo cut-off piston assembly in the body.
4. Install the o-ring on the turbo cut-off cap then install the cap in the body.
5. Install the retaining ring in the body, making certain that it is fully seated in its groove.
6. Before placing vehicle back into service, perform the Operation & Leakage Tests detailed in this manual.

ASSEMBLY - PURGE/RELIEF VALVE

1. Lubricate the piston o-ring with the grease supplied in the Bendix maintenance kit. Also, lubricate completely around the outside edge of the purge valve.
2. Install the purge valve in the body. Make certain that it is firmly and squarely seated in the body with the correct side visible. Note: The three (3) "bumps" on the purge valve should not be visible. If the three (3) "bumps" are visible after the purge valve is installed, the valve must be removed and re-installed.
3. Install the o-ring on the purge piston, then install the piston in the body taking care not to cut the piston o-ring.
4. Install the non-metallic exhaust cover and spring in the body.
5. Install the retaining ring in the groove in the body. Make certain that it is fully seated in its groove.
6. If so equipped, reconnect the exhaust line from the exhaust port of the air dryer.
7. Re-tighten the supply port line.
8. Before placing vehicle back into service, perform the Operation & Leakage Tests stated elsewhere in this manual.

ASSEMBLY - HEATER AND THERMOSTAT

1. Lubricate the connector o-ring with the grease supplied in the Bendix maintenance kits.
2. Install the o-ring on the connector, then slide the heater and thermostat assembly into the body making certain not to cut the o-ring. Note that the "tab" on the assembly fits into the corresponding slot in the body.
3. Install the retaining ring in the groove in the body, making certain that it is fully seated in its groove.
4. Apply a dielectric grease on the heater and thermostat connector contacts (both the heater and thermostat and vehicle wiring harness connector halves).

5. After making certain the accordion seal is in place on the vehicle wire harness connector, connect the wire harness to the heater and thermostat assembly on the dryer until its lock tab snaps ("clicks") into place.
6. Before placing the vehicle back into service, perform the Operation & Leakage Tests stated elsewhere in this manual.

ASSEMBLY - DESICCANT CARTRIDGE

1. Lubricate the desiccant cartridge sealing ring with the grease supplied in the Bendix maintenance kits and replacement parts.
2. Screw the desiccant cartridge onto the body (by hand) until the seal makes contact with the body. Rotate it clockwise **approximately one full turn**. If necessary, place a strap wrench or equivalent tool on the desiccant cartridge next to the lip low on the cartridge.

Note: If the replacement cartridge is supplied with an o-ring for the dryer threads, discard it. **This o-ring is not to be used.**

IMPORTANT: If the cartridge removed was a Bendix® PuraGuard® oil coalescing style cartridge, it **must** be replaced with another PuraGuard-style cartridge.

3. Before placing vehicle back into service, perform the Operation & Leakage Tests outlined in this manual.

INSTALLATION

1. Install the assembled Bendix® AD-RP™ air dryer back onto the vehicle using the same three mounting bolts retained during removal. Tighten, then torque the three cap screws to 50 lb-ft.
2. Reconnect the four air lines to the proper ports on the body (identified during disassembly). If the fittings were removed from the body, use a thread sealant making certain none enters the body during re-installation.
3. Apply a dielectric grease on the heater and thermostat connector contacts (both the heater and thermostat and vehicle wiring harness connector halves).
4. After making certain the accordion seal is in place on the vehicle wire harness connector, connect the wire harness to the heater and thermostat assembly on the dryer by plugging it into the air dryer connector until its lock tab snaps ("clicks") into place.
5. If so equipped, reconnect the exhaust line to the exhaust port of the air dryer.
6. Before placing vehicle back into service, perform the Operation & Leakage Tests stated elsewhere in this manual.

RETROFITTING THE BENDIX® AD-RP™ AIR DRYER

GENERAL

The following retrofit instructions are presented for reference purposes only. Bendix® replacement air dryers are packaged with the most up-to-date installation instructions. The instructions packaged with the Bendix® AD-RP™ air dryer should be followed instead of those presented here. **The preceding portion of this manual deals with "in-service" repair and/or replacement of the AD-RP air dryer. This portion of the manual is concerned with installing an AD-RP air dryer on a vehicle not previously equipped with one.**

VEHICLE APPLICATION REQUIREMENTS

The basic application requirements presented here apply to a standard air dryer installation. The majority of highway vehicles in use today will meet these basic requirements, however some may not. Examples of vehicles that may not meet the requirements include refuse trucks, city coaches, bulk trailer unloading operations and other high air consumption systems. While the AD-RP air dryer can be used on these vehicles, the standard installation procedure presented in this manual may require modification to ensure proper operation and service life. Consult your local authorized Bendix parts outlet or sales representative for additional information.

1. Charge Cycle Time - The AD-RP air dryer is designed to provide clean, dry air for the brake system. When a vehicle's air system is used to operate non-brake air accessories it is necessary to determine that — during normal, daily operation — the compressor should recover from governor "cut-in" to governor "cut-out" (usually 110 psi to 130 psi) in 90 seconds or less at engine RPMs commensurate with the vehicle vocation.
Note: *The Bendix AD-RP air dryer must be used in conjunction with governors which have a 120 to 130 psi nominal cut-out pressure.* If a governor is used that is not within this limitation, contact your Bendix parts outlet or sales representative for additional information. If the recovery time consistently exceeds this limit, it may be necessary to "by-pass" the air accessory responsible for the high air usage.
2. Purge Cycle Time - During normal vehicle operation, the air compressor must remain unloaded for a minimum of 30 seconds. This minimum purge time is required to ensure complete regeneration of the desiccant material. If the purge time is occasionally shorter than the times specified, no permanent ill effect should be expected. If the purge time is consistently less than the minimum, however, an accessory by-pass system must be installed.

3. European Air Brake Systems - The AD-RP air dryer must not be installed in brake systems that incorporate compressors without integral unloading mechanisms and/or utilize a compressor discharge line unloader valve. When vehicles of this type are encountered, other Bendix air dryer models must be used. Consult your local authorized Bendix parts outlet or sales representative for additional information.
4. Air Compressor Size - The AD-RP air dryer was designed primarily for use with compressors rated up to 30 CFM. Contact and authorized Bendix parts outlet or a Bendix sales representative for assistance when using the AD-RP dryer with a compressor which has a rated displacement exceeding 30 CFM.
5. Holset "E or QE" Type Air Compressors - The AD-RP dryer can be installed with the Holset Type "E or QE" compressor. When the AD-RP air dryer is used in this installation, the Holset ECON valve should be removed and the special orifice check valve in the "make-up" line should be removed and replaced with a conventional single check valve.
6. Use the following guidelines to determine the vehicle application suitable for the Bendix AD-RP air dryer:

Total Vehicle Reservoir Volume	Requirement
Less than 12,500 cu. in.	Bendix® AD-RP™ Air Dryer (use kit part no. 5008972)
Greater than 12,500 cu. in.	Contact Bendix Commercial Vehicle Systems LLC.

VEHICLE PREPARATION

1. Park the vehicle on a level surface and prevent movement by means other than the brakes.
2. Drain all reservoirs to 0 psi (0kPa).

LOCATING THE BENDIX® AD-RP™ AIR DRYER ON VEHICLE

1. The Bendix® AD-RP™ air dryer must be mounted vertically (purge exhaust port toward road surface) outside the engine compartment in an area of air flow while the vehicle is in motion. The AD-RP air dryer must not be exposed to direct wheel splash (note: locating behind an axle mud flap is acceptable).
2. Locate the AD-RP air dryer as close to the first (supply) reservoir as possible.
3. Do not locate the AD-RP air dryer near heat producing components such as the vehicle exhaust, and make certain adequate clearance from moving components (e.g. drive shaft, suspension, pitman arm, etc.) is provided.
4. Locate the Bendix AD-RP air dryer on the vehicle so that a minimum of one (1) inch clearance above the cartridge is available to allow cartridge servicing. Additionally, provide access to the bracket bolts so the unit may be removed when necessary.
5. When choosing the mounting location for the AD-RP dryer, note the discharge line length requirements stated under the heading Connecting the Air Lines, elsewhere in this manual.

Note: Under normal operating conditions, the maximum inlet air temperature for the AD-RP dryer is 160° F.

MOUNTING THE BENDIX AD-RP AIR DRYER

1. Install the AD-RP air dryer by referring to Figure 7 and drilling the triangular mounting hole pattern in a mounting plate and then mounting the plate on the vehicle, or by drilling the mounting hole pattern in the area of the vehicle chosen for mounting. **Note:** Check the vehicle manual before drilling a frame member.
2. Important: The length of the three mounting bolts used to attach the AD-RP air dryer to the mounting plate is very important. Refer to Figure 8. The threaded end of the 1/2"-13 UNC bolt must be between 1/8" below, to 1/4" above, the surface of the AD-RP dryer mounting bracket surface when fully installed and tightened to 50 lb-ft. Damage to the dryer body will result if the bolt warning is ignored. Measure the thickness of all materials that the three mounting bolts must pass through. Small adjustments can be made using flat washers under the bolt heads. Do not use more than three (3) flat washers.
3. Mount the AD-RP air dryer on the vehicle using three 1/2" bolts (grade 5 min.) of the proper length and washers. Torque to 50 lb-ft.

CONNECTING THE AIR LINES

Important General Instructions

These instructions apply to all installations of the AD-RP dryer regardless of whether the unit is replacing an existing air dryer, or is being installed on a vehicle that never had one installed. If the vehicle is currently equipped with an air dryer some additional considerations apply.

- A. If the AD-RP air dryer is replacing an integral purge air dryer — such as the Bendix® AD-9® air dryer — on a vehicle equipped with any compressor except the Cummins-Holset type E & QE, all that is necessary is that the air dryer be removed and the existing air lines be correctly connected to the AD-RP dryer. An additional purge volume (minimum 200 cubic inches) must also be installed and connected to the AD-RP Remote Purge Port. The extended Purge Volume Kit 5008972 can be used.
- B. If the AD-RP air dryer is replacing an integral purge air dryer — such as the Bendix® AD-4™ or AD-9 air dryer — on a vehicle equipped with a Cummins-Holset type E or QE compressor, in addition to removing the existing air dryer and correctly connecting the existing air lines to the AD-RP dryer, it will be necessary to remove and discard the Holset ECON and special orifice check valve.

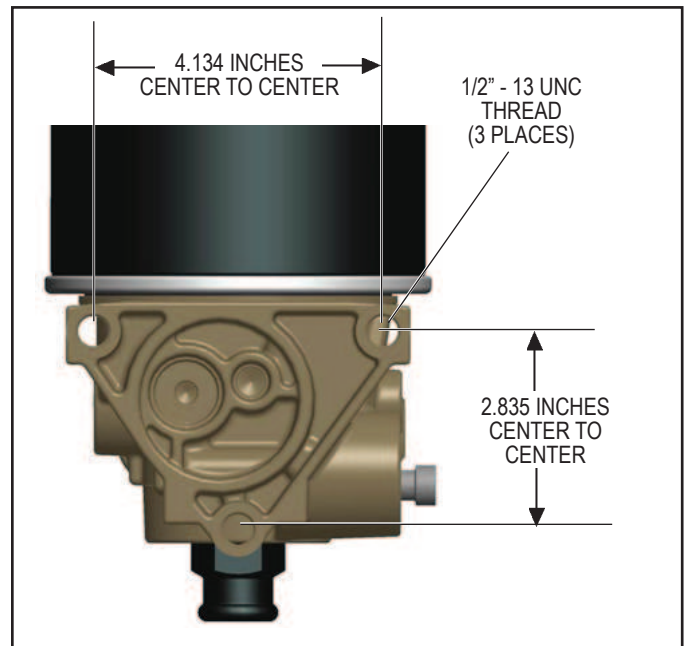


FIGURE 7 - BENDIX® AD-RP™ SYSTEM PURGE AIR DRYER MOUNTING BRACKET DIMENSIONS

PURGE CONTROL LINE

1. Install a purge control air line having a minimum inside diameter of 3/16" between the Bendix® AD-RP™ air dryer control port and an unused unloader port on the governor. The control line must be plumbed direct to the governor and not in series with automatic drain valves, lubrication systems, etc.
2. The control line should slope downward to the AD-RP dryer without forming potential water traps.

DISCHARGE LINE

GENERAL

Refer to Appendix A / Table A for recommended discharge line lengths and sizes for various vehicle applications and vocations.

PURGE EXHAUST LINE

1. If it is necessary to direct AD-RP air dryer discharge contaminants away from vehicle components, a 1" (25.4 mm) I.D. hose can be clamped on the AD-RP dryer exhaust.

WIRING THE HEATER/THERMOSTAT

1. Determine the vehicle's electrical system voltage and make certain that the Bendix AD-RP air dryer that is to be installed contains the same voltage heater. Confirm the proper voltage by noting the color of the heater and thermostat connector.

The AD-RP air dryer is available with either a 12- or 24-volt heater. Each uses 90 watts of power.

2. A separate wire harness and splice kit is with all AD-RP air dryer replacements and retro-fit kits. Refer to the instructions contained in that kit for the proper wiring procedure.

Heater & Thermostat Connector	
Voltage	Color
12 Volts	White (No other markings)
24 Volts	Gray, or White w/Red Dot

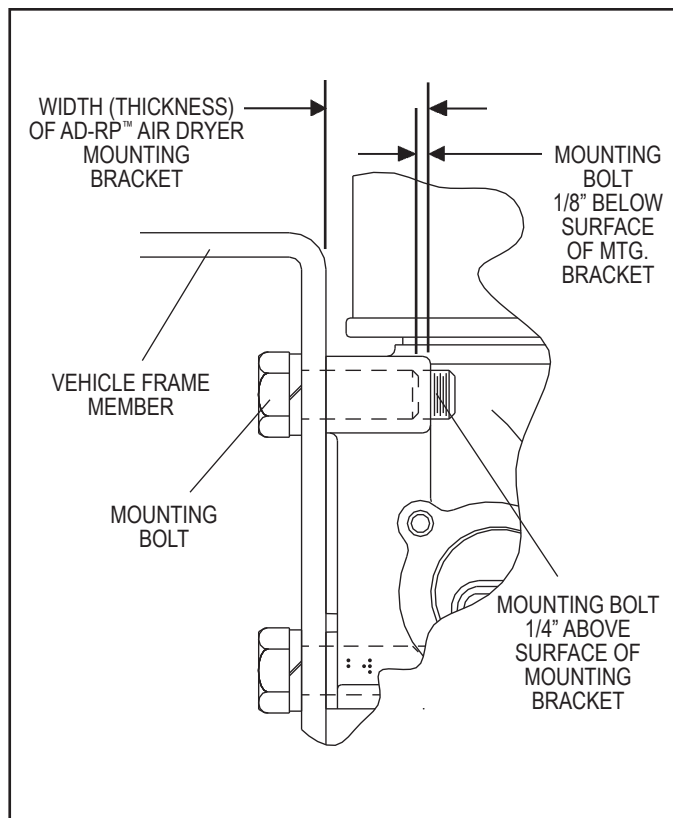


FIGURE 8 - BENDIX® AD-RP™ SYSTEM PURGE AIR DRYER MOUNTING BRACKET BOLT LENGTHS

TESTING THE BENDIX AD-RP AIR DRYER

GENERAL OPERATIONAL STATEMENT

The AD-RP remote purge air dryer, operates differently than integral purge air dryers such as the Bendix® AD-9® air dryer.

The "Remote Purge", designation is used because this air dryer uses a small additional volume mounted on the frame rail to purge or dry the desiccant material. During the purge cycle, the pressure in this purge volume will drop to 0 psi. This volume is separate from the air brake system volume, no pressure drop in the air brake system should be caused by the purge cycle of the AD-RP air dryer.

TESTING THE BENDIX® AD-RP™ AIR DRYER

Before placing the vehicle in service, perform the following tests:

1. Close all reservoir drain cocks.
 2. Build up system pressure to governor cut-out and note that the Bendix® AD-RP™ air dryer purges with an audible escape of air.
 3. Apply and release the service brakes to reduce system air pressure to governor cut-in. Note that the system once again builds to full pressure and is followed by a purge at the AD-RP air dryer exhaust.
4. It is recommended that the following items be tested for leakage to ensure that the AD-RP air dryer will not cycle excessively.
 - (A) Total air system leakage (See Bendix publication BW5057 "Air Brake Handbook.")
 - (B) Compressor unloader mechanism
 - (C) Governor
 - (D) Drain cock and safety valve in the first (supply) reservoir
 - (E) All air connections leading to and from the first (supply) reservoir; and the
 - (F) Delivery check valve.

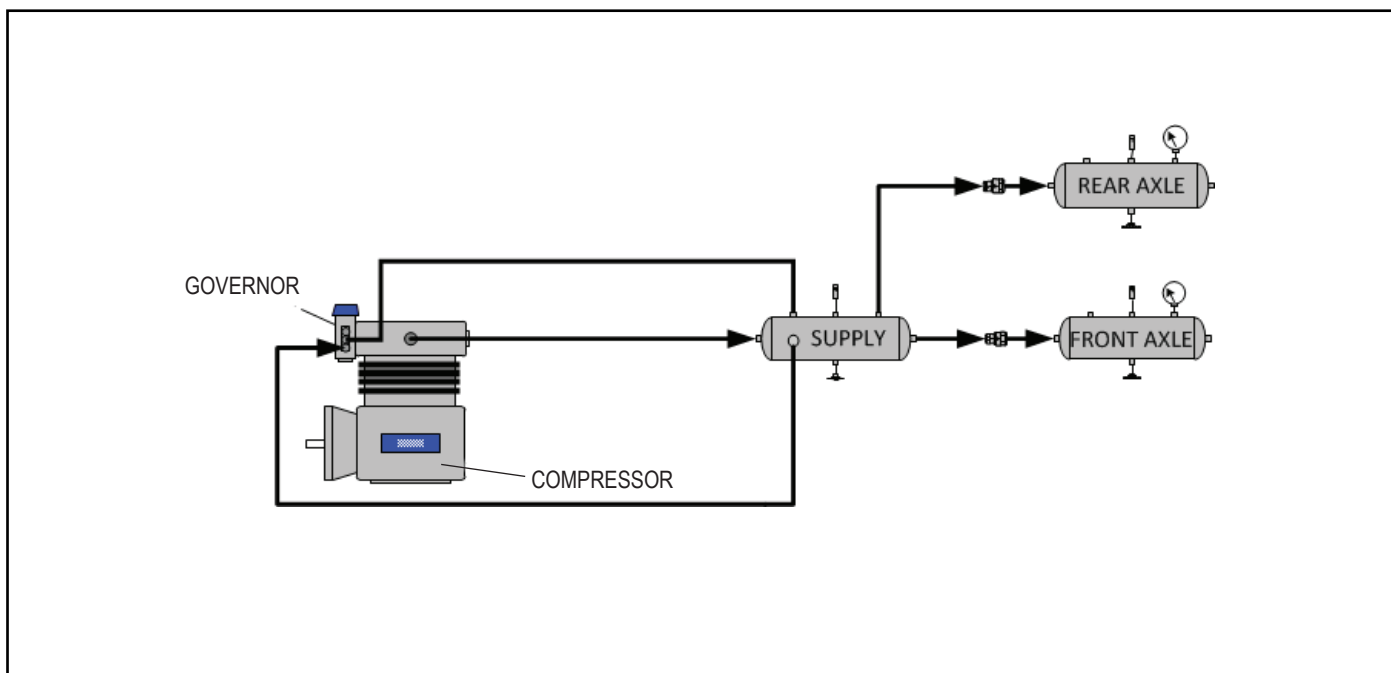


FIGURE 9 - AIR SYSTEM WITHOUT BENDIX® AD-RP™ REMOTE PURGE AIR DRYER

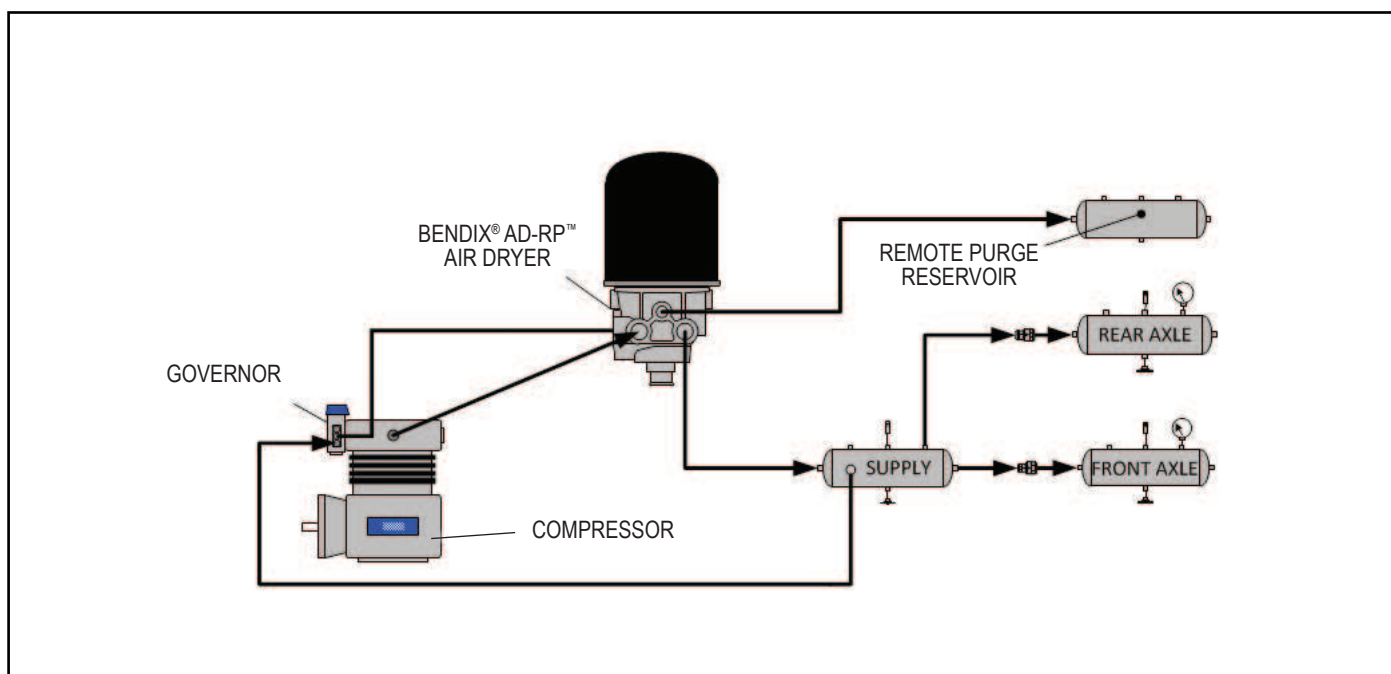
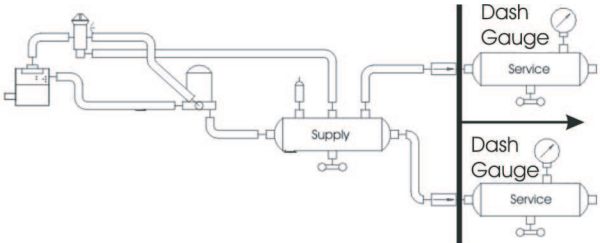
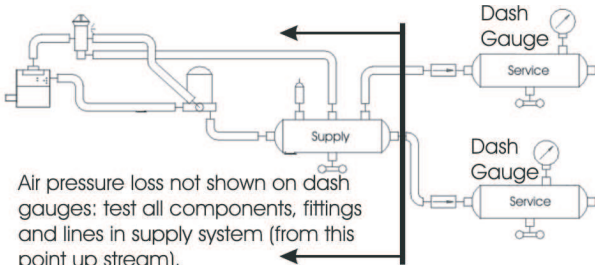
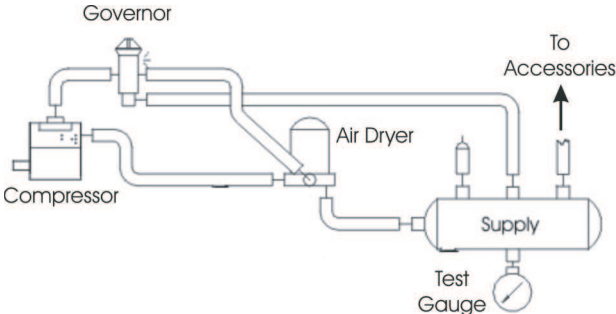


FIGURE 10 - AIR SYSTEM WITH BENDIX® AD-RP REMOTE PURGE AIR DRYER

Bendix® AD-RP™ AIR DRYER TROUBLESHOOTING CHART

SYMPTOMS	CAUSE	REMEDY
1. Air dryer is constantly "cycling" or purging. Air dryer purges frequently (every 4 minutes or less) while vehicle is idling.	<p>A. Excessive system leakage. IMPORTANT: Note whether air pressure loss is shown on dash gauge(s). Pressure loss shown on the gauges is caused by service brake system or component leakage. Pressure loss NOT SHOWN on the gauges is caused by supply system or component leakage.</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p>Air pressure loss shown on dash gauges: test all components, fittings and lines in service brake system (from this point down stream).</p> </div> <div style="text-align: center;">  <p>Air pressure loss not shown on dash gauges: test all components, fittings and lines in supply system (from this point up stream).</p> </div> </div> <p>Remove the drain cock, or valve, in the supply reservoir (wet tank) and install an air gauge. Build the system pressure, allow the air dryer to purge. Observe the air gauge in the supply reservoir. The pressure drop should not exceed 1 psi per minute. Perform the following tests (1 to 5) in the order presented.</p> <div style="text-align: center;">  </div>	<p>A. If leakage IS SHOWN on the gauges, test for excessive service brake system leakage.</p> <p>Allowable leakage:</p> <p>Single vehicle - 1 psi / minute per service reservoir.</p> <p>Tractor Trailer - 3 psi / minute per service reservoir.</p> <p>Repair and retest as required.</p>

(continued)

Bendix® AD-RP™ AIR DRYER TROUBLESHOOTING CHART

SYMPTOMS	CAUSE	REMEDY
1. Air dryer is constantly "cycling" or purging. Air dryer purges frequently (every 4 minutes or less) while vehicle is idling. (continued)	A. Excessive system leakage. IMPORTANT: Note whether air pressure loss is shown on dash gauge(s). Pressure loss shown on gauges is caused by service brake system or component leakage. Pressure loss NOT SHOWN on the gauges is caused by supply system or component leakage. (continued)	<p>A. <u>Test fittings, hoses, lines and connections.</u> Apply soap solution to detect excessive leakage. Tighten or replace, as needed, then repeat the air dryer charge/purge cycle and observe the gauge installed in the supply reservoir. If the leakage is within limits, remove the gauge from the reservoir and replace the drain cock or valve. If excessive leakage is detected, continue testing.</p> <p><u>Test accessories connected to supply reservoir.</u> Drain all air pressure from the system, disconnect all air lines leading to accessories (fan clutch, wipers, air seats, etc.) and plug the reservoir at the disconnection point. Build air system pressure until the air dryer purges and observe the supply reservoir gauge. If the leakage is no longer excessive, repair or replace the leaking accessory. If excessive leakage is detected, continue testing.</p> <p><u>Test governor leakage.</u> Build the system pressure to governor cut-out, turn off the engine and apply a soap solution to the governor exhaust port and around the governor cap. Leakage should not exceed a one (1) inch bubble in five (5) seconds. Reduce the system pressure to 80 psi or less, and re-apply soap solution. Leakage should not exceed a one (1) inch bubble in five (5) seconds. If excessive leakage is detected in either test, repair or replace the governor.</p> <p><u>Test compressor unloader leakage.</u> Drain all air pressure from the system and remove the governor from the compressor. Temporarily plug the governor unloader port or the air line that mated with — or connected to — the compressor. Build the air system pressure until the air dryer purges, then IMMEDIATELY SHUT OFF THE ENGINE. Observe the air gauge in the supply reservoir. If the leakage is within limits, replace the compressor unloaders. Re-connect the governor to the compressor (after removing the plug installed in governor) and retest while observing the supply reservoir gauge. If excessive leakage is detected, continue testing.</p> <p><u>Test the air dryer purge valve and outlet (delivery) check valve.</u> Drain all air pressure from the system, remove the control line connection at the air dryer, and plug the end of the air line leading to the governor (not the air dryer control port). Build the system pressure to governor cut-out and observe the air gauge. If little or no pressure drop is observed, replace the air dryer check valve. If the pressure drop continues, apply a soap solution to the air dryer purge exhaust and purge control port (where the control line was removed). Leakage should not exceed a one (1) inch bubble in five (5) seconds. If leakage is excessive, repair or replace purge valve assembly.</p>

(continued)

Bendix® AD-RP™ AIR DRYER TROUBLESHOOTING CHART

SYMPTOMS	CAUSE	REMEDY
1. Air dryer is constantly "cycling" or purging. Air dryer purges frequently (every 4 minutes or less) while vehicle is idling.	B. Incorrect governor setting or malfunctioning governor.	B. Minimum setting required for Bendix® AD-RP™ air dryer installation is 100 psi cut-in and 120 psi cut-out. Test operation of the governor. Repair or replace as necessary.
	C. Rapid cycling of the governor due to air starvation at the reservoir (RES) port of the governor.	C. With a gauge installed at the RES port of the governor, the pressure should not drop below cut-in pressure at the onset of the compressor "unloaded" cycle. If the pressure drops, check for "kinks" or restrictions in the line connected to the RES port. The line connected to the RES port on the governor must be the same diameter, or preferably larger, than the lines connected to the UNL port(s) on governor.
	D. High air usage vehicle application.	D. Refer to the "Vehicle Application Requirements" section of this manual and verify the application.
2. Water and/or oil in supply or service reservoir.	A. Improper discharge line length or improper line material. Maximum air dryer inlet temperature is exceeded.	A. Refer to the section titled "Connecting the Air Lines" and Appendix A/ Table A/ columns 1 & 2, then check the line size and length.
	B. Air system charged from an outside air source (outside air not passing through air dryer).	B. If the system must have an outside air fill provision, outside air should pass through air dryer. This practice should be minimized.
	C. Air dryer is not purging.	C. See Symptom #5.
	D. Purge (air exhaust) time insufficient due to excessive system leakage.	D. Check causes and remedies for Symptom #1.

(continued)

Bendix® AD-RP™ AIR DRYER TROUBLESHOOTING CHART

SYMPTOMS	CAUSE	REMEDY
2. Water and/or oil in supply or service reservoir. <i>(continued)</i>	<p>E. Excessive air usage, duty cycle is too high; the air dryer is not compatible with the vehicle air system requirement (improper air dryer/vehicle application).</p> <p>NOTE: Duty cycle is the ratio of time the compressor spends building air to total engine running time. Air compressors are designed to build air (run "loaded") up to 25% of the time. Higher duty cycles cause conditions that affect air brake charging system performance which may require additional maintenance. Factors that add to the duty cycle are: air suspension, additional air accessories, use of an undersized compressor, frequent stops, excessive leakage from fittings, connections, lines, chambers or valves, etc.</p>	<p>E. See Appendix A/Table A/column 1 for the recommended compressor sizes. If the compressor is "too small" for the vehicle vocation (for example, where a vehicle's vocation has changed, or service conditions exceed the original vehicle or engine OE specs), then upgrade the compressor. Note: The costs incurred (e.g. installing a larger capacity compressor, etc.) are not covered under the original compressor warranty.</p> <p><u>Charge Cycle Time</u> - The Bendix® AD-RP™ air dryer is designed to provide clean, dry air for the brake system. When a vehicle's air system is used to operate non-brake air accessories, the compressor should recover from governor cut-in to governor cut-out (usually 100 psi to 120 psi) in 90 seconds or less at engine RPMs commensurate with the vehicle vocation. If the recovery time consistently exceeds this limit, it may be necessary to "by-pass" the air accessory responsible for the high air usage. An example of where a by-pass system would be required is when the compressor is used to pressurize a tank trailer for purposes of off-loading product. Consult your local authorized Bendix® parts outlet or sales representative for additional information.</p> <p><u>Purge Cycle Time</u> - During normal vehicle operation, the air compressor must remain unloaded for a minimum of 30 seconds. This minimum purge time is required to ensure complete regeneration of the desiccant material. If the purge time is consistently less than the minimum, an accessory bypass system must be installed. Consult your local authorized Bendix parts outlet or sales representative for additional information.</p> <p><u>Air Compressor Size</u> - The AD-RP air dryer was designed primarily for use with compressors rated up to 30 CFM. Contact an authorized Bendix parts outlet or a Bendix sales representative for assistance when using the AD-RP dryer with a compressor which has a rated displacement exceeding 30 CFM.</p>

(continued)

Bendix® AD-RP™ AIR DRYER TROUBLESHOOTING CHART

SYMPTOMS	CAUSE	REMEDY
2. Water and/or oil in supply or service reservoir. <i>(continued)</i>	F. Air compressor discharge and/or air dryer inlet temperature is too high.	<p>F. <u>Restricted discharge line</u> - See Appendix A/ Table A/ column 1 & 2 for recommended sizes. If discharge line is restricted — or more than 1/16" carbon build up is found — replace the discharge line. Replace as necessary.</p> <p><u>Discharge Line Freeze-Up</u> - The discharge line must maintain a constant slope down from the compressor to the air dryer inlet fitting to avoid low points where ice may form and block the flow. If, instead, ice blockages occur at the air dryer inlet, insulation may be added here. Or, if the inlet fitting is a typical 90° fitting, the fitting may be changed to a straight or a 45° fitting. For more information on how to help prevent discharge line freeze-ups, see Bendix Bulletins TCH-008-021 and TCH-008-022. Shorter discharge line lengths or insulation may be required in cold climates.</p> <p><u>Insufficient coolant flow through compressor</u> - Inspect the Bendix AD-RP™ air dryer was designed primarily for use with compressors rated up to 30 CFM. Contact an authorized Bendix parts outlet or a Bendix sales representative for assistance when using the dryer with a compressor which has a rated displacement exceeding 30 CFM.</p> <p><u>Coolant line</u> - Replace as necessary (I.D. is 1/2" min.). Inspect the coolant lines for kinks and restrictions, and the fittings for restrictions. Replace as necessary. Verify coolant lines go from the engine block to compressor and back to the water pump. Repair as necessary.</p> <p><u>Restricted air inlet</u> (not enough air to compressor). Check the compressor air inlet line for restrictions, brittleness, soft or sagging hose conditions, etc. Repair as necessary. Inlet line size is 3/4 I.D. the maximum restriction requirement for compressors is 25 inches of water. Check the engine air filter and service if necessary (if possible, check the air filter usage indicator).</p>

(continued)

Bendix® AD-RP™ AIR DRYER TROUBLESHOOTING CHART

SYMPTOMS	CAUSE	REMEDY
2. Water and/or oil in supply or service reservoir. <i>(continued)</i>	F. Air compressor discharge and/or air dryer inlet temperature is too high. <i>(continued)</i>	<u>Poorly filtered inlet air</u> (poor air quality to compressor). Check for leaking, damaged or malfunctioning compressor air inlet components (e.g. induction line, fittings, gaskets, filter bodies, etc.). Repair the inlet components as needed. Note: <i>Dirt ingestion will damage the compressor and is not covered under warranty.</i> If you found excessive oil in the service reservoir and you did not find any issues above, the compressor may be passing oil. Replace the compressor and — if still under warranty — follow the normal warranty process.
	G. Compressor malfunction.	G. If you found excessive oil present in the service reservoir and you did not find any issues above, the compressor may be passing oil. Test the compressor using the Bendix® BASIC™ cup method as described in the Bendix compressor service manual and referred to in Appendix A/Table A/column 5. Replace the compressor and — if it is still under warranty — follow the normal warranty process.
	H. Air by-passes the desiccant cartridge assembly.	H. When replacing the desiccant cartridge, make sure the desiccant cartridge assembly is properly installed and sealing rings are in place on the mounting surface of the desiccant cartridge.
	I. Desiccant cartridge requires replacement.	I. Replace the desiccant cartridge assembly. Refer to Appendix A/Table A/columns 3 & 4 for recommended intervals.
3. Oil present at air dryer purge exhaust or cartridge during maintenance.	A. Air brake charging system is functioning normally.	A. Air dryers remove water and oil from the air brake charging system. A small amount of oil is normal. Check that regular maintenance is being performed and that the amount of oil in the air tanks (reservoirs) is within the acceptable range shown on the BASIC cup (see also column 5 of Appendix A/Table A). Replace the air dryer cartridge as needed and return the vehicle to service.
4. Air is escaping from air dryer exhaust during the charge cycle but able to build system air pressure. (Compressor pumping.)	A. Air dryer purge valve leaking.	A. Repair or replace air dryer purge valve.
	B. Compressor unloader mechanism malfunction.	B. One or both dash air gauges should show higher than normal air pressure. Test the compressor unloader mechanism for proper operation. Repair or replace unloaders as necessary.
	C. Governor malfunction.	C. One or both dash air gauges may show higher than normal air pressure. Test the governor for proper operation. Repair or replace as necessary.

(continued)

Bendix® AD-RP™ AIR DRYER TROUBLESHOOTING CHART

SYMPTOMS	CAUSE	REMEDY
4. Air is escaping from air dryer exhaust during the charge cycle, but is able to build system air pressure. (Compressor pumping.) (continued)	D. Air flow to the supply reservoir is restricted.	D. Kinked, plugged, damaged hose tubing or fittings: Check to determine if air is reaching the first reservoir. Inspect for kinked tubing or hose. Check for undrilled fittings or restricted hose or tubing fittings. Repair or replace as necessary. Desiccant cartridge plugged: Check compressor for excessive oil passing and/or correct compressor installation. Repair or replace as necessary. Replace the desiccant cartridge.
	E. Excessive pressure pulsations from compressor. (Typical single cylinder type.)	E. Increase the volume in the discharge line by adjusting the length or size of line, or add a ping tank.
5. Air escaping from air dryer exhaust port during entire purge cycle. (Compressor not running.)	A. Leaking turbo cut-off valve in Bendix® AD-RP™ air dryer.	A. Note the dash gauges to verify the purge cycle has ended. Perform the air dryer "Operation & Leakage Tests" specified in this manual. Repair or replace as necessary.
	B. Leaking purge piston o-ring in the AD-RP air dryer.	B. Perform the Air Dryer "Operation & Leakage Tests" specified in this manual. Repair or replace as necessary.
	C. Leaking delivery check valve.	C. Perform the Air Dryer "Operation & Leakage Tests" specified in this manual. Repair or replace as necessary.
6. Unable to build air system pressure and air is not escaping from the AD-RP air dryer exhaust during the charge cycle. (Note: This is not the same as symptom 4.)	A. Frozen discharge line.	A. Inspect the discharge line installation for water traps that could freeze. Refer to "Connecting The Air Lines" section in manual. Repair or replace as necessary.
	B. Compressor unloader mechanism malfunction.	B. Test the compressor unloader mechanism for proper operation. Repair or replace as necessary.
	C. Governor malfunction.	C. Test the governor for proper operation. Repair or replace as necessary.
	D. Air flow to service brake system is restricted or plugged. Air pressure on one dash gauge normal with no, or low pressure on the other gauge.	D. Check for kinked, plugged, damaged hose tubing or fittings in the air line between the supply reservoir and low pressure service reservoir.

(continued)

Bendix® AD-RP™ AIR DRYER TROUBLESHOOTING CHART

SYMPTOMS	CAUSE	REMEDY
7. Unable to build air system pressure.	A. Bendix® AD-RP™ air dryer purge control line incorrectly connected to governor.	A. Check that the purge control of the AD-RP air dryer is connected to the UNL (unloader) port on governor.
	B. Air trapped in the purge control line (between the governor and the AD-RP air dryer.)	B. Inspect for kinked, plugged, damaged hose tubing or fittings. Check for undrilled fittings or restricted hose or tubing fittings. Repair or replace as necessary.
	C. Governor malfunction.	C. Test the governor operation. Repair or replace as necessary.
	D. Compressor unloader mechanism malfunction.	D. Test the compressor unloader mechanism for proper operation. Repair or replace as necessary.
	E. The AD-RP air dryer purge valve piston is frozen open.	E. Check the operation of the AD-RP air dryer heater and thermostat. Repair or replace as necessary.
	F. The AD-RP air dryer purge valve piston is stuck.	F. Check the operation and repair or replace as necessary.
8. Air dryer does not purge or exhaust air. Note: this symptom often precedes Symptom #9 if desiccant cartridge is not replaced.	A. Air is not reaching the AD-RP air dryer purge control port.	A. Test to determine that air flows through the purge control line to the purge control port on the AD-RP air dryer when the compressor is unloaded. Check for undrilled fittings. Check if the purge control line is broken, not connected, mis-connected, frozen or damaged. Inspect, repair or replace as necessary. Replace desiccant cartridge.
	B. The AD-RP air dryer purge valve or piston is frozen closed.	B. Check the operation of the AD-RP air dryer heater and thermostat. Repair or replace as necessary. Replace desiccant cartridge.
	C. Extremely high air usage requirements on the vehicle.	C. Refer to the Vehicle Application Requirements section of this manual and verify application.

(continued)

Bendix® AD-RP™ AIR DRYER TROUBLESHOOTING CHART





SYMPTOMS	CAUSE	REMEDY
9. Desiccant material is being expelled from the air dryer purge valve exhaust (may look like whitish liquid, paste, or small beads). – OR Unsatisfactory desiccant life.	A. This symptom is almost always accompanied by one or more of Symptoms 1, 2, 3, 4 and 6. See the related causes for these symptoms.	A. See the related remedies for the causes under Symptoms 1, 2, 3, 4 and 6*.
	B. Air dryer not securely mounted. (Excessive vibration.)	B. Vibration should be held to minimum. Add bracket supports or change the air dryer mounting location if necessary*.
	C. Defective desiccant cartridge.	C. Replace*.
	D. Compressor passing excessive oil.	D. Check for proper compressor installation; if symptoms persist, replace compressor*.
	E. Air dryer has not purged for an extended period.	E. Refer to Symptom #7 Causes and Remedies*.
10. “Pinging” noise excessive during compressor loaded cycle.	A. A single cylinder compressor with high pulse cycles.	A. A slight “pinging” sound may be heard during system build up when a single cylinder compressor is used. If this sound is deemed objectionable, it can be reduced substantially by increasing the discharge line volume. This can be accomplished by adding an additional four feet of discharge line, or adding a 90 cubic inch reservoir between the compressor and the Bendix® AD-RP™ air dryer.
11. The air dryer purge piston cycles rapidly in the compressor unloaded (non-compressing) mode.	A. Compressor fails to “unload.”	A. Faulty governor installation: no air line from the governor to the compressor, or the line is “kinked” or restricted. Install or repair the air line.
* If desiccant material is being expelled, the cartridge and purge valve must be removed from the air dryer and the desiccant material must be removed from the interior of the dryer. Clean the interior surfaces of the dryer and install a new cartridge. Clean and inspect the purge valve before re-installation, or replace with a new purge valve.		

NOTES

Appendix A

Table A: Maintenance Schedule and Usage Guidelines

Regularly scheduled maintenance is the single most important factor in maintaining the air brake charging system.

Vehicle Used for:	No. of Axles	Column 1	Column 2		Column 3	Column 4	Column 5
		Typical Compressors Spec'd	Discharge Line		Recommended Air Dryer Cartridge Replacement ¹	Recommended Reservoir Drain Schedule ²	Acceptable Reservoir Oil Contents ³ at Regular Drain Interval
			I.D.	Length			
Low Air Use							
<div>Compressor with less than 15% duty cycle</div> <div>e.g. Line haul single trailer w/o air suspension, air over hydraulic brakes.</div> <div></div>	5 or less	<div>Bendix® BA-921® air compressor</div> <div>Bendix® Tu-Flo® 550 air compressor</div>	1/2 in.	6 ft.	Every 3 Years	Recommended Every Month - max of every 90 days	<div>Bendix® BASIC™ test acceptable range: 3 oil units per month. See Appendix A.</div>
<div>Compressor with up to 25% duty cycle</div> <div>e.g. Line haul single trailer with air suspension, school bus.</div> <div></div>	5 or less		1/2 in.	9 ft.			
High Air Use							
<div>Compressor with up to 25% duty cycle</div> <div>e.g. Double/triple trailer, open highway coach/RV, (most) pick-up & delivery, yard or terminal jockey, off-highway, construction, loggers, concrete mixer, dump truck, fire truck.</div> <div></div>	8 or less	<div>Bendix® Tu-Flo® 750 air compressor</div> <div>Bendix® BA-921® air compressor</div> <div>Bendix® BA-922®, or DuraFlo 596™ air compressor</div>	1/2 in.	12 ft.	Every 2 Years	Every Month	<div>For the BASIC Test Kit: Order Bendix P/N 5013711</div> <div>BASIC test acceptable range: 5 oil units per month. See Appendix A.</div>
<div>Compressor with up to 25% duty cycle</div> <div>e.g. City transit bus, refuse, bulk unloaders, low boys, urban region coach, central tire inflation.</div> <div></div>	12 or less		5/8 in.	12 ft.			

Footnotes:

- With increased air demand the air dryer cartridge needs to be replaced more often.
- Use the drain valves to slowly drain all reservoirs to zero psi.
- Allow the oil/water mixture to fully settle before measuring oil quantity.
- To counter above normal temperatures at the air dryer inlet, (and resultant oil-vapor passing upstream in the air system) replace the discharge line with one of a larger diameter and/or longer length. This helps reduce the air's temperature. If sufficient cooling occurs, the oil-vapor condenses and can be removed by the air dryer. Discharge line upgrades are not covered under warranty. Note: To help prevent discharge line freeze-ups, shorter discharge line lengths or insulation may be required in cold climates. (See Bendix Bulletins TCH-008-021 and TCH-008-022, included in Appendix B, for more information.)
- For certain vehicles/applications, where turbo-charged inlet air is used, a smaller size compressor may be permissible.

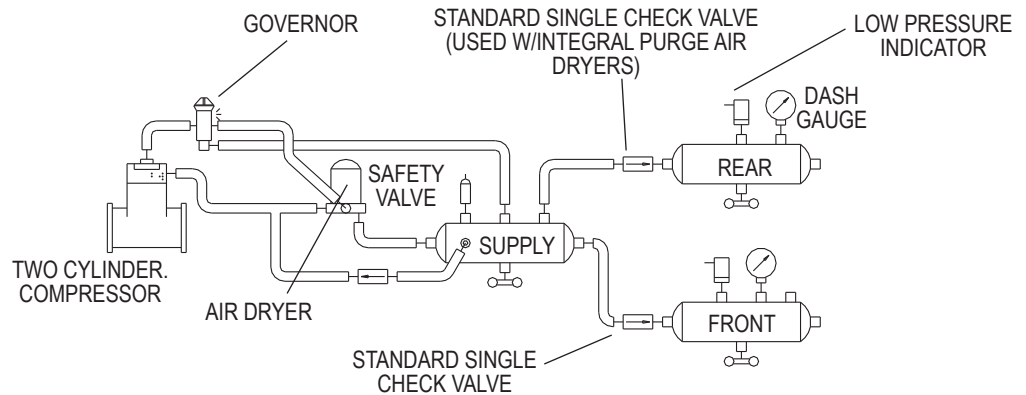
Note: Compressor and/or air dryer upgrades are recommended in cases where duty cycle is greater than the normal range (for the examples above).

For Bendix® Tu-Flo® 550 and 750 compressors, unloader service is recommended every 250,000 miles.

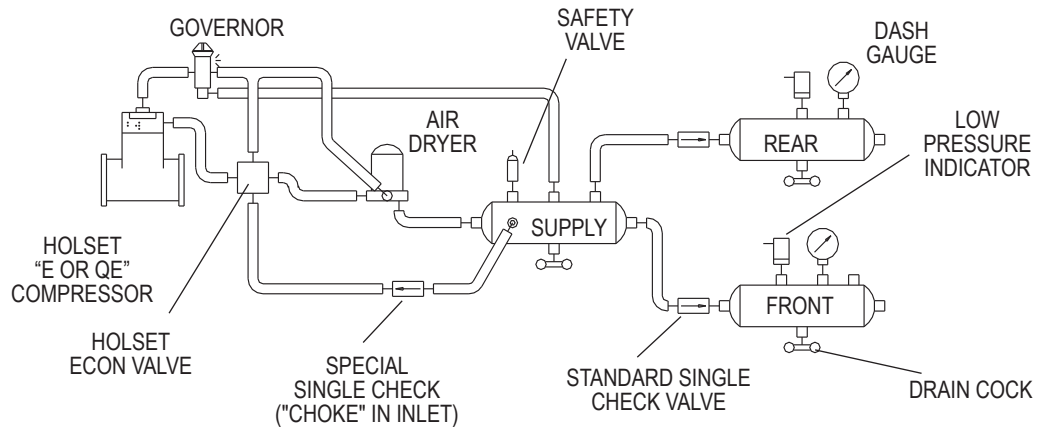
Appendix B

For more troubleshooting information refer to Troubleshooting Charging and Air Supply Systems (BW1779). This and other literature are available, online, from the Bendix Literature Center on www.bendix.com.

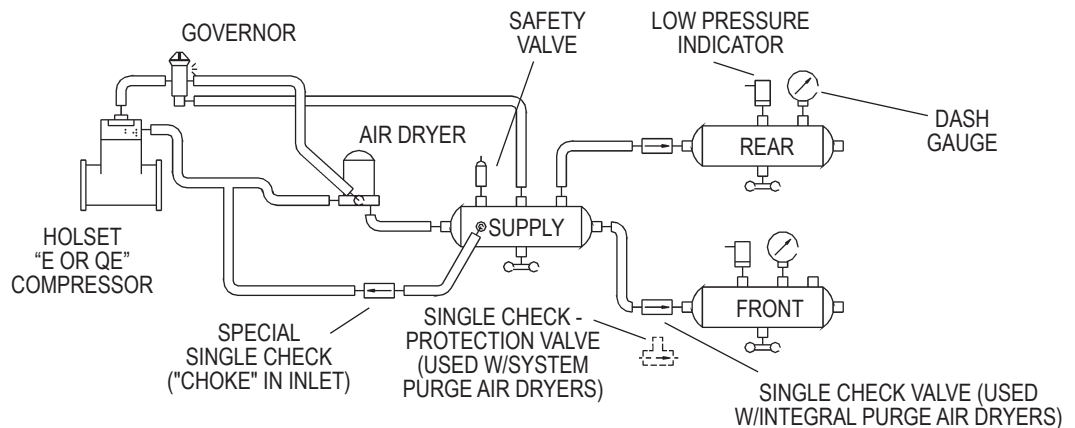
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